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1 - INITIALIZATION OF NEW BOARD

In the case of a new board, proceed as follows:

to confirm.

- switch on the machine keeping **MENU** pressed
- wording "INIT NOVRAM" appears.
- press

SUCH OPERATION CAUSES THE LOSS OF ANY CALIBRATION OR PRESETTING CARRIED OUT PREVIOUSLY.

- Calibrate the machine again according to requirements.

2 - TO CHANGE SUPPLY VOLTAGE

Option not available.

3 - CHECKING AND CALIBRATION OF THE GAUGES

▶ 3.1 - Calibration of the distance potentiometer

- Access the Self-Diagnostics Screen ((self-Diagnostics)
- Remove the weight shelf and refit the tip on the gauge rod.
- Back-off the set screws fastening the pulley on the potentiometer shaft.
- With the gauge fully retracted, turn the potentiometer shaft keeping the pulley still until reading, alongside the wording "DIST", a number between 1500 and 2000.
- Then retighten the set screws to secure the pulley on the shaft.
- Proceed to calibrate the rim distance gauge (I CALIBRATIONS)

► 3.2 - Calibration of the diameter potentiometer

- Access the Self-Diagnostics Screen (If SELF-DIAGNOSTICS)
- Remove the diameter potentiometer from the gauge rod after backing off relative set screw.
- Slightly pull out the gauge rod and rest its stop on the machine shaft in external position close to the base.
- Turn the potentiometer shaft until reading, alongside the wording "DIAM", a number between 1500 and 2000, then
 again insert it in its correct working position.
- Lock the potentiometer with relative set screw
- Proceed to calibrate the diameter gauge (I CALIBRATIONS)

▶ 3.3 - Calibration of width and ems sonars (optional)

- Access the Self-Diagnostics Screen (I SELF-DIAGNOSTICS)
- Place a flat surface at about 12 cm from the width sonar and check that, alongside the wording "SONAR 1", there
 are variations in the number displayed.
- If during checking, after making the calibration, an inaccuracy on the measurement is found exceeding 1/2", repeat the calibration by varying the distance between the tyre and sensor (tolerance +/- 20 mm from the measu rement made with a ruler) until the correct width value is obtained.
- Repeat the same operation for the EMS sonar checking the number alongside the wording "SONAR 2".

4 - ASSEMBLY OF THE PIEZO MEASURERS

ASSEMBLY INSTRUCTIONS

Problems of excessive compensation and out-of-phase sometimes depend on a fault in the piezo measurers.

- To replace them, proceed as follows:
- 1. Remove the weight shelf.
- 2. Remove nuts 1 and 2 with relative cup springs and washers.
- 3. Back-off screws 3, 4, 6 and 5 then disassemble the various parts.
- 4. Reassemble the various parts without tightening the nuts being careful to follow the correct sequence.



N.B.: Mount the piezo units in accordance with the position of the coloured wires shown in the drawing.

5. Keeping the spindle perfectly aligned, tighten the nuts 5 and 6 with a spanner, and nuts 3 and 4 by hand (by half a turn with the spanner if necessary).

6. Refit the washers, cup springs and nuts 1 and 2. Tighten the nuts fully in order to fully regain the elasticity of the cup springs, then loosen them by half a turn. This will automatically ensure correct preloading on the piezo (a torque wrench can be used set to 400 kg. cm.).

7. Cover the piezo units with a generous layer of silicone.



N.B.: for correct operation, insulation of the piezo crystals should be greater than 2000 Mohm.

- 8. Reassemble the various parts.
- 9. Again carry out the automatic calibration.





5 - TROUBLE SHOOTING SEQUENCE

Tests on power board:

- 1) Transformer output on CN1
- 2) Protection fuses
- 3) SONAR power supply
- 4) BRAKING transfer output on CN7
- 5) Computer power supply





6 - POWER SUPPLY LAYOUT DIAGRAM

3



7 - TO REPLACE POWER BOARD

4



8 - HOW TO CHECK FUNCTIONING AND ACCURACY

Further to some notices informing us of defects and unaccuracies not clearly traceable, we are explaining hereunder the procedure how to check functioning and accuracy to help us to detect problems.

FIRST CHECKS

- Accurate wiping of adapter and cones
- Spring cover sliding
- Shaft end blocking

1. Cleaning the encoder

Remove the weight holder.

Insert a tool until it touches the phase disc (use a soft brush to prevent damaging the decals). Slowly turn the wheel by hand several times to allow the tool to remove any residual dust. Never force the tool on the phase generator.

After cleaning, close the weight holder.

2. Test encoder

The encoder test must be run:

- during the initial wheel balancer test phase;
- If replacing the encoder card;
- If replacing, cleaning or generally working on the encoder decals;
- In the event of repeated errors 1,2,11,12,13,14,15,16,17,18, 20 detected by the wheel balancer during the unbalance measurement phase;
- In the event of unjustified unbalance oscillation.

Before running the encoder test, ALWAYS check that there is a maximum distance of 1 mm between the decal and the encoder card and that the retaining nuts of the encoder card are adequately tightened. Use a wheel of average dimensions.

Access to the encoder test function:

- From the main panel, press the MENU button
- Press the button
 Special functions
 Press the button
 Machine self-test

Press the button
 Initial test:

2 Encoder

A window with the signals ENCA, ENCB and ENCR appears on-screen. Manually turn the wheel and check that the ENCA and ENCB pulses increase constantly; the number in correspondence to the word POS must vary in the range 0-.128. The ENCR signal must appear once every complete turn of the wheel.

In the event of irregular behaviour:

- 1. Check the connection cable between the encoder card and the CPU board.
- 2. Check that the maximum distance between the encoder card and the decal is 1 mm;
- 3. Clean the encoder decal;
- 4. Replace the encoder card;
- 5. Replace the CPU board.
- Press the **START** button: the wheel balancer runs a test cycle at high speed after which it provides the indications

listed below.

> No. ck encoder

The decal has 32 distinct notches, therefore, the test result must ABSOLUTELY supply 32 pulses for ENCA and 32 pulses for ENCB; any other value is unacceptable for proper functioning of the wheel balancer.

> Timing signal

- 1. The ENCA timing signal must absolutely be different from the ENCB timing signal;
- 2. The ENCA timing signal must be as far as possible greater than the ENCB timing signal;

3. The numerical value is affected by the distance of the encoder card from the decal and by the dimension of the notches on the decal.

> MIN

ERRORS	MEANING	TEST ENCODER
Err. 1	No reset signal.	 Check the connection cable between the encoder card and the CPU board. Check positioning of the encoder card. Clean the encoder decal. Replace the encoder card Replace the CPU board
Err. 2	Encoder test speed not reached.	 Check positioning of the encoder card. Clean the encoder decal. Replace the encoder card Replace the CPU board
Err. 4	Incorrect direction of rotation.	1. Check the encoder card connection cable.
Err. Encoder 1	Rising edge fault detected for ENCA.	 Check positioning of the encoder card. Clean the encoder decal.
Err. Encoder 2	Falling edge fault detected for ENCB.	 Check positioning of the encoder card. Clean the encoder decal.
Err. Encoder 3	Falling edge fault detected for ENCA.	 Check positioning of the encoder card. Clean the encoder decal.
Err. Encoder 4	Rising edge fault detected for ENCB.	 Check positioning of the encoder card. Clean the encoder decal.
Err.reset ENCA	Detected irregular behaviour of the ENCA falling edge with respect to the reset rising edge.	 Check positioning of the encoder card. Clean the encoder decal. Move the encoder card up or down.
Err.reset ENCB	Detected irregular behaviour of the ENCB falling edge with respect to the reset rising edge.	 Check positioning of the encoder card. Clean the encoder decal. Move the encoder card up or down.
STOP	[STOP] button pressed during test.	1. Repeat the test.

3. Gauge calibration (use an average size wheel with steel rim i,.e. 14" x 6" ± 1") - [CALIBRATION and CHECKING AND CALIBRATION OF THE GAUGES -

 $DIAM. = \pm \frac{1}{2}$ "

• DIST./DIAM./LA WIDTH:

Calibrate gauges and check accuracy. it is necessary to set the correct distance rate to obtain an accurate width measure.

WIDTH= $\pm \frac{1}{4}$ "

Tolerances: DIST.= 5 mm I • SONAR WIDTH (balancers with monitor):

- 1. Find the distance between pincers outer plan and Sonar head by keeping distance gauge in 0 position according to the graduated band.
- 2. Set ambient temperature
- 3. Select "Width sonar calibration"
- Set distance rate found at point 1)

Make sure calibration is correct. Amend distance rate (+/- 20 mm) if necessary until getting an accurate width indication.

4. Calibration (CALIBRATION)

- Use the same wheel as for gauge calibration
- Set accurate measures, in manual mode if necessary
- Make self-calibration

5. Checking machine oscillation

Access to the wheel balancer oscillation test function:

- From the main panel, press the MENU button
- Press the button

- Press the button 3 Machine self-test
- Press the button button (service) and enter the password 1+3+5+7 to enable the wheel balancer test

functions (for specialised personnel only).

- Press the button
 Auto
- Set the number of test spins (recommended value = 20)
- Set the time between one spin and the next (recommended value = 5 sec.)
- Press the **START** button.

The wheel balancer runs the number of spins set in automatic cycle and provides the maximum oscillation value.

6. Checking machine calibration

With the wheel perfectly balanced, apply 100 g first on the outside and then on the inside.

The wheel balancer must measure:

FI=0FE=100Weight F.E. = position = 6 o'clockFI=100FE=0Weight F.I. = position = 6 o'clockMax. permitted tolerance 100 g = 5%.

7. Checking the adapter

Turn a fine balanced wheel upside down (180°) and detect unbalance rates ERR.MAX =

This check-out in particular must be made with a sample wheel whose max unbalance errors due to centering are well known (generally lower than 10 gr. for iron wheels).

9 - PROGRAMMING THE BALANCING BOARD VIA PC

To program the board the following is required:

- a PC;
- A serial cable;
- A floppy disk containing the program to load:
- to create this floppy, take a new one to which the following files need to be copied:
- Mxxxx.bl (the machine program)
- Fmld.exe (the program used to load the Mxxxx.bl file to the flash memory of the machine)
- Load.bat (the file which runs all the operations necessary)
- Operations on the machine:
- 1 Switch off the balancing machines.
- 2 Close the jumper (highlighted in the photo).
- 3 Connect one end of the serial cable to the serial output (see fig. 5).
- 4 Switch on the machine: The words "MEMORY LOADER......" appear on the screen. *Operations on the PC:*
- 5 Connect the other end of the serial cable to the serial output of the PC.
- 6 Switch on the PC.
- 7 Insert the floppy in the PC.
- 8 In Windows environment:
- a Click on Start[®] , Run
 - b Type A:LOAD and press Enter

In DOS environment:

- a- Type A:LOAD and press Enter
- At the prompt "COM Port [1/2]:" select the serial port 1 or 2 of the PC used.

The following appears on the PC screen:

"Wait, testing file ",

```
"Wait, testing file....OK", (*)
```

"LINK OK!"

"Status = 1%"

Wait for loading to finish (about 10 min.):

"Status=99% "

The DOS prompt reappears.

9 - Switch off and reopen the jumper.





10 - SOFTWARE UPGRADE BY USB LOADER SERVICE

1. Run FMWload program

2. Select the port COM number where you have connected the USB Loader service

😿 FM WinLoader			
v 1.0	Select a file, ther	hit [LOAD]	
<u>File select</u> Port	СОМ1 ▼ ✓ СОМ1 СОМ2	PCB loa Flash Memory Loaded (%)	ider v.
QUIT	СОМЗ СОМ4 5 СОМ5 СОМ6 СОМ7 СОМ8	40 50 60 70 80 90 100 CI RxEi	DMerr

- 3. Select the file you want to load in your USB Loader device (ex: M2037.BL), pushing [File Select] button
- 4. Start the download, pushing [LOAD] button

FM WinLoa	ader												_0
/1.0	Se	elect a	a file, 1	then h	nit [LO	AD]							
Eile seler	at k:N	Eprom	\M230	7.BL	_	_	_	_	_	_			_
	Port CC)M3	1	E FI	ash Me	smory L	.oaded					PCB loader v.	
LOAD			a de te	Ť			Ner .						
	Ó	lò	20	30	40	50	60	70	80	90	100	COMerr	-
QUIT												RxErrCode	

- 5. After the download is done, you can:
- Stop FWW load and disconnect USB Loader device fron the USB port
- Eject the SDcard from the Serial Loader device, wait a couple of seconds, insert a new SDcard and then press [LOAD] again to make a new download.

Use of the Serial Loader device by main board

To download the file from SDcard to the main board by using the USB Loader device, please follow the following steps:

- 1. The main board (balancing machine) must be switched off
- 2. Connect the USB Loader to the board by using the 10 wire flat-cable. Into the USB Loader must be already inserted the SDcard with the program to download to the board
- 3. Switch the board on; this will switch the USB Loader device on as well. Video shows the status of the main board programming.
- 4. Wait until the complete download is done (green bar 100%).
- 5. Switch off the main board (balancing machine)
- 6. 6. Disconnect USB Loader device.
- 7. 7. Switch on again the balancing machine to start the new firmware program.

USB Loader device LED

The USB Loader device has a 2-color LED to show the state:

PC → USB Loader device

RED flashing: SD/MMC not present or invalid RED fixed: PC link ok RED/YELLOW alternating: SD/MMC erasing or setting GREEN/RED alternating: receiving file from PC GREEN fixed: download OK

<u>USB Loader device</u> → PCB connection (flat cable)

RED flashing: SD/MMC not present or invalid RED/YELLOW alternating: waiting link with the main board GREEN/RED alternating: sending file to the main board GREEN fixed: download OK

11 - WHEEL MEASUREMENT AND PRESETTING ON THE BALANCING MACHINE

The ever increasing need for more accurate calibration and use of the ALU functions means that it is important to establish how to measure the rims and how the balancing machine interprets the preset data. Hence a description is now given of how to modify the preset dimensions automatically in order to obtain the distances of the correction planes which are defined as through planes for the centres of gravity of the corrective weights.

Consider a typical rim: size "l", given as width by the rim manufacturer, differs from the measurement of the distance between the correction planes for the rim thickness and physical dimensions of the counterweight, whose centre of gravity is located at distance "h" from the resting point of the rim edge.

The balancing machine automatically corrects the measurement preset by adding $2 \times h = 6$ mm to the measurement. Measurement "b" made with the gauge is generally more accurate even if very similar to the measurement " ℓ " known to the rim user. The two measurements differ only by the thickness of the sheet metal, usually about 2 mm per side. Such insignificant distance means that an accurate calibration can be obtained regardless of whether the inner rim with " ℓ " or outer width "b" is preset. It is a good rule to add $\frac{1}{4}$ inch to the value given by the manufacturer. As regards the ALU functions, the machine performs the following approximations in addition to the systematic correction regarding the centre of gravity of the counterweight as seen above.

N.B.: I = INSIDE E = OUTSIDE
a = a preset - 8 mm b = b preset - 11 mm dI = d preset dE = dI
a = a preset - 3 mm b = b preset - 16 mm dI = d preset dE = dI - 1"
a = a preset - 8 mm b = b preset + 11 mm dI = d preset dE = dI + 1"
ALUS a = al preset - 8 mm b = aE - al dI = dI preset dE = dI - 1"
ALUS VARIANT a = al preset - 3 mm b = (aE - al) - 5 mm dI = dI preset dE = dI - 2"